



OBG | There's a way

Acid Tar Site in NY - Air Emission and Odor Control Techniques

PREPARED FOR: Mark Austin, U.S. Environmental Protection Agency
Ed Barth, U.S. Environmental Protection Agency

COPY TO: Russell Downey, Pfizer Inc.
Vince D'Aco, BSI

PREPARED BY: O'Brien & Gere Engineers, Inc.

DATE: March 9, 2018

PURPOSE

The purpose of this technical memorandum is to provide information regarding air emission and odor control techniques demonstrated to be effective at an acid tar remediation site in New York State (NY Site) and provide similarities to Operable Unit 8 (OU8) (i.e., Impoundments 1 and 2) at the American Cyanamid Superfund Site in Bridgewater, New Jersey (ACSS). The Site details provided below are available in documents prepared for regulatory agencies and therefore publicly available.

NEW YORK SITE PROJECT BACKGROUND

The NY Site is estimated to contain less than 50,000 tons of acid tar in several ponds. The acid tar consists of an organic (tar-like) and an acid phase (aqueous phase) with the organic phase containing primarily benzene, toluene, xylene, and naphthalene at levels up to 5% by volume of each compound and the acid phase having a pH between 1 and 2.6.

Previous field efforts have assisted in identifying the following components of the remedy:

- Excavation of acid tar
- On-site dewatering of acid tar as needed to remove free liquids for transport
- Transport of acid tar off-site to a Resource Conservation and Recovery Act (RCRA) permitted thermal processing facility for beneficial reuse as fuel in a cement kiln
- Use of temporary spray-on covers, shrouds and other methods as needed (e.g., orchard fans) for air emission and odor controls
- Community air and odor monitoring

Approximately 30,500 tons of acid tar have been shipped off-site for beneficial reuse (used as fuel for cement kilns) since 2014. The NY Site components of the remedy, along with techniques used to monitor and control air and odor emissions are discussed in the following sections. These demonstrated techniques used for the NY Site are consistent with the description of Alternative 6 being considered as a potential remedy for ACSS OU8 as presented in the Focused Feasibility Study Report.



NEW YORK SITE – OFF-SITE THERMAL PROCESSING FOR BENEFICIAL REUSE

EXCAVATION

NY Site Overview

Acid tar was removed with a long reach tracked excavator and either direct loaded into shipping containers or into dewatering equipment prior to loading into shipping containers, which included dry bulk tankers, modified dry bulk tankers, or dump trailers. Excavation of acid tar has been performed through surface water on the pond(s) and when the surfaces were dry. Peninsula roads were constructed within each pond to access the center of the ponds. Open excavation areas were minimized and spray-on covers were applied during excavation as needed and as a cover during times when active excavation in that area was not occurring.

Air Emission and Odor Control Techniques

The primary air emission and odor control technique was spray-on fiber-based covers, which are used to cover the pond's surfaces when surface water (due to precipitation) was not present. The spray-on covers were also used during remedial activities. The excavation activity has been identified as the primary source for potential air emissions and odors, both at the pond surface when excavation uncovered acid tar and at the excavator bucket when acid tar was moved from the pond to the dewatering and loading equipment. The spray-on cover of the ponds was maintained throughout each day of the NY Site activities (before, during and at the end of each work day). As needed to further minimize emissions, spray covers were applied to the excavation area (i.e., pond surface) and excavated material in the excavator bucket before its transport to dewatering and loading equipment. Occasionally during warmer weather, the spray-on cover of the pond surfaces was maintained during the weekend when there were no remedial activities.

Orchard fans, installed along parts of the NY Site perimeters closest to remedial activities, were used as contingency controls. The fans were effective at reducing property line odor and emission levels during periods of low ambient wind speeds (<5 mph), which are conditions when odors tend to be worst-case.


During periods of moderate to heavy precipitation, surface water developed on the pond surfaces, which was also an effective method for controlling air emissions and odors.

Spray Cover Effectiveness

During the execution of previous field efforts at the NY Site, three different short-term cover formulae (intended for application to last one day) and six different long-term cover formulae (intended for application to last several days), including varying mixtures of fiber (cellulosic) and polymer, were tested on pond material to evaluate their speed, effectiveness, and longevity in reducing air emissions, measured as total volatile organic compounds (TVOCs). The short-term cover selected and used at the NY Site instantly achieved greater than 98% reduction in TVOC emissions at the source. The long-term covers selected instantly achieved greater than 97% reduction in TVOCs at the source and maintained that effectiveness over several days. These spray covers were used effectively to manage air emissions and odors during the daily excavation and dewatering activities as well as throughout the weekends as necessary. The tests identified some cover products that were not as effective and slower at reducing emissions, and therefore were not selected for use at the NY Site. Prior to and after each year of tar removal, when there would be long periods of inactivity, cement-based spray-on cover was often applied to provide long-term emission and odor suppression.

Anticipated Similarities and Differences to ACSS Impoundments 1 and 2 (OU8)

Impoundments 1 and 2 at the ACSS are approximately 15 feet deep from the top of their berms, similar to the deepest portions of the NY Site's ponds. Impoundments 1 and 2 are both approximately 300 feet wide and 300 feet long similar to the widest portions of the NY Site's ponds. Long reach excavators and peninsula roads have been demonstrated to facilitate access at the NY Site for material excavation near the ponds' centers.



A water cap is maintained on the surface of Impoundments 1 and 2 for air emission and odor suppression. It has been demonstrated during the acid tar project at the NY Site that excavation can be performed through a water cap. Should excavation of material from Impoundments 1 and 2 require removal of the water cap, spray-on fiber-based covers have been demonstrated to be effective for dry surfaces. These covers can also be used, as needed, on exposed excavated material.

The NY Site has multiple ponded areas of material which required monitoring for cracks of the surface covers. Impoundments 1 and 2 are proximate to each other, approximately 1/3 of the NY Site's surface area, and are covered by water, which reduces the potential for fugitive emissions from the impoundment not undergoing active remediation. Thus, spray covers are not likely to be required on the ACSS impoundments with a water cap.

In summary, (1) emissions from excavation of ACSS Impoundments 1 and 2 can be similarly controlled as demonstrated at the NY Site, and (2) given the constantly maintained water cap on the ACSS impoundment not being remediated, spray-on covers for this impoundment's surfaces should not be necessary.

DEWATERING

NY Site Overview

The NY Site's dewatering system included dewatering screw equipment and belt conveyors to transfer dewatered material to the shipping containers. It also included a drain box used to separate free liquid from the acid tar prior to transferring the material to the dewatering screw or directly to the shipping containers.

Dewatering using the dewatering screw conveyor was generally performed in warmer months (April through November), as there is a significant reduction in the throughput of the system when the temperature of the material falls below 40 degrees Fahrenheit (°F). This is attributed to the exponential increase in material viscosity as temperature decreases.

Air Emission and Odor Control

Control of air emissions and odors included designing equipment to minimize contact of material with wind. These design components included the depth of the dewatering screw hopper and shrouds on the belt conveyor. Spray-on cover was sometimes applied to material placed in the hopper, however the need for this control was rare.

Anticipated Similarities and Differences to ACSS Impoundments 1 and 2

Bench-scale mechanical dewatering tests on material from ACSS Impoundment 2, conducted in 2016¹, indicate that a dewatering system similar to that used at the NY Site will produce a shippable material for off-site beneficial reuse. The viscosity testing of material from ACSS Impoundment 2 (hard and crumbly (HC), viscous rubbery (VR), mix of HC/VR), indicates a viscosity that is an order of magnitude lower than that of the NY Site's acid tar. These results suggest that material from ACSS Impoundments 1 and 2 may be suitable for dewatering in colder temperatures, which could extend the active remediation season longer than what was achieved at the NY Site. Operating during colder ambient air temperatures is expected to reduce the volatilization of organics from the material and reduce potential air emissions and odors.

¹ O'Brien & Gere, 2016. Mechanical Dewatering Bench-Scale Testing Report. O'Brien & Gere, May 31, 2016

In summary, the same dewatering systems and emission control techniques used at the NY Site can be effective for ACSS Impoundments 1 and 2, and emissions could be further reduced during cold weather operations.

AIR AND ODOR MONITORING

Overview

NY Site Community Receptors

The NY Site is bordered to the west, south and east by industrial properties and by major roads. The following are approximate distances from the closest NY Site remedial activity to potential receptors:

- 1) Nearest receptor: 280 feet
- 2) Nearest residence: 1,800 feet
- 3) Nearest highway: 150 feet
- 4) Nearest public area: 1,000 feet

NY Site Monitoring Program

Air sampling during previous excavation activities (field trials) at the NY Site detected the presence of volatile organic compounds (VOCs), consisting primarily of benzene, toluene, xylenes, and naphthalene; and hydrogen sulfide (H₂S) in the five ponds. The perimeter air monitoring program evaluated potential air quality impacts from VOCs, H₂S, odors, and dust. Ten fixed air monitoring stations were located along or inside the NY Site perimeter. In addition, one portable air monitoring station was positioned in between the two fixed stations most directly downwind of remedial activities. The portable air monitoring station was moved during the day if the predominant wind direction shifted into a new quadrant or if the work area changed. Wind direction was continuously monitored each day using an on-site weather station.

Continuous real-time air monitors for TVOC operated at each fixed station and the portable station, while dust (PM₁₀) monitors operated at four of the fixed stations and the portable station.

H₂S monitoring consisted of real-time measurements; however, since the analyzer is not designed to operate in a continuous mode, measurements were made in a survey mode at approximately 3-hour intervals at each downwind air monitoring station. More frequent measurements at downwind stations were made if H₂S detection or odors were observed downwind of site activities.

Odor levels were quantified in terms of “odor units” using a portable field olfactometer. Observations were made at approximately 3-hour intervals at each downwind air monitoring station. More frequent observations at downwind stations were made if increased odors were observed downwind of NY Site activities. If odors were observed, then additional controls and/or countermeasures of site-related odors were implemented.

The following are the air monitoring criteria established for the NY Site:

Monitoring Parameters (units)	Investigate Level ^a	Control Level ^b	Work Perimeter Limit ^c
TVOC (ppm)	0.5	0.7	0.9
PM ₁₀ (µg/m ³)	100	125	150
H ₂ S (ppb)	6	8	10

^a Investigate possible emission source(s)

^b Apply controls and countermeasures of suspected emission source(s)

^c Temporarily halt or modify emission source activities

The criteria were based on one-hour averages corrected for background. Background levels were determined by the monitoring results of upwind monitoring locations for respective time periods. The TVOC criteria presented above were developed for the NY Site using the composition of individual VOCs in the headspace of the ponds' material and the New York State Department of Environmental Conservation's Short-term Guideline Concentration (SGC). The TVOC criteria is based on benzene because it was found as the highest component in headspace and has the lowest SGC of the other detected compounds.

Over the four-year program, consisting of 494 days of excavation and dewatering activities (10 hr days), there were three one-hour periods when the work perimeter was reached, which represents 0.06 percent of the total program period. In each instance, immediate (prior to the end of the hourly averaging period) actions were taken to reduce emissions, such that perimeter air quality levels decreased to background levels for the subsequent one-hour average. There were no exceedances of the PM₁₀ and H₂S work perimeter limits over the four-year program.

NY Site Emission Control Coordination

Action levels (Investigate and Control) and Work Perimeter limits were defined for the parameters. The monitoring system sent alerts (via text or email message) to the on-site air monitoring technician whenever action levels were exceeded. As an added precaution to prevent action level exceedances, alerts were also sent to inform the technician of elevated 1-minute average readings. The technician then informed the NY Site construction manager and/or lead emission control operator of the expected source of increased emissions and the need to initiate additional controls, or modify or halt operations.

Anticipated Similarities and Differences to ACSS Impoundments 1 and 2

The ACSS is in an industrial/commercial area. OU8 (Impoundments 1 and 2) is in the southeast corner of the ACSS. Commuter and freight rail lines run through or bound the ACSS to the north and south. Industrial and commercial facilities are located to the west and east. Roads, including an interstate, border the ACSS on three sides. The southern portion of the ACSS is bordered by undeveloped wetlands and the Raritan River. Except for the adjacent Somerset Tire Service (STS) Property on the east side of the North Area, all potential receptors are separated from the ACSS by buffering space provided by railroad corridors, stream channels, highway/road embankments, wooded areas, wetland areas, and/or the Raritan River.

The following are the approximate distances between Impoundments 1 and 2 and the nearest receptors at the ACSS:

- Nearest receptor: approximately 400 feet to the north
- Nearest residential property: approximately 1,800 feet to the east
- Nearest highway: Interstate 287 approximately 950 feet to the east
- Nearest public area: Delaware and Raritan Canal State Park Trail: 900 feet to the south
- Nearest public area to the north: Somerset Patriots Baseball Park and New Jersey Transit train station approximately 2,200 feet to the north

The similarity between the NY Site and OU8 at the ACSS is that OU8 can also be closely monitored and closely coordinated for air emissions. The primary difference between the sites is that the distance to the nearest receptor is 280 feet for the NY Site and 400 feet for the ACSS. The additional distance at the ACSS would aid in the ability to minimize the potential for off-site air emissions and odors.

SUMMARY

The table below summarizes characteristics of the NY Site as compared to OU8 at the ACSS, as related to air emissions and odors. Based on the effective implementation of emission and odor controls at the NY Site, the smaller surface area of Impoundments 1 and 2, the constant water cap on the impoundments, and the longer distances to nearest receptor at OU8, it is anticipated that successful emission and odor controls can be achieved at the ACSS.

Table 1: Comparison of the NY Site versus OU8 at the ACSS

Items	NY Site	OU8 at the ACSS
Excavation	<ul style="list-style-type: none">■ Minimize open area■ Spray open area of pond, bucket, and hopper as required	<ul style="list-style-type: none">■ Minimize open area■ Spray open area of Impoundment, bucket, and hopper as required
Max Depth	<ul style="list-style-type: none">■ ~12 ft	<ul style="list-style-type: none">■ ~15 ft
Acres	<ul style="list-style-type: none">■ ~11 acres	<ul style="list-style-type: none">■ ~4 acres
Surface Water Cover	<ul style="list-style-type: none">■ Non-existent during dry weather conditions	<ul style="list-style-type: none">■ Constantly maintained on “inactive” Impoundment
Dewatering	<ul style="list-style-type: none">■ Covered conveyor■ Deep hopper	<ul style="list-style-type: none">■ Covered conveyor■ Deep hopper
Spray covers	<ul style="list-style-type: none">■ 98% reduction	<ul style="list-style-type: none">■ Expected to be 98% reduction – use same spray covers and application methodology
Nearest Receptor	<ul style="list-style-type: none">■ ~280 ft	<ul style="list-style-type: none">■ ~400 ft
Nearest Residence	<ul style="list-style-type: none">■ ~1800 ft	<ul style="list-style-type: none">■ ~1800 ft
Nearest Public Highway	<ul style="list-style-type: none">■ ~150 ft	<ul style="list-style-type: none">■ ~950 ft
Nearest Public Area	<ul style="list-style-type: none">■ ~1000 ft	<ul style="list-style-type: none">■ ~900 ft
Operating Season	<ul style="list-style-type: none">■ April – November	<ul style="list-style-type: none">■ March - December